

WEEDS OF THE NULLARBOR IN WESTERN AUSTRALIA

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ABSTRACT

A 2009 survey of weeds on the southern Nullarbor listed 98 species. This is an increase of 20 species over the number previously recorded. The most serious weeds of the region are Wards Weed (*Carrichterra annua*), Prickly Turnip (*Brassica tournefortii*), Annual Veld Grass (*Ehrharta longiflora*) and Box Thorn (*Lycium ferocissimum*). New weeds appear to be mainly spreading via the road network and more regular surveys may uncover potentially serious weeds before they spread.

INTRODUCTION

Since a major biological survey was undertaken on the Nullarbor Plain in 1984 (McKenzie and Robinson 1987), little has been written on the flora of this remote region. During a traverse of the southern Nullarbor and parts of the Hampton IBRA regions conducted by me in 2009, collections and notes were made on the weeds of these adjacent bio-regions.

Regional weed surveys are rarely undertaken in Western Australia. However, at present the Department of Environment and Conservation is undertaking a State wide prioritization of weeds impacting on natural environmental values and this brief note is presented to update

the known weed flora of this remote region.

RESULTS

Fifty-six naturalised plants (weeds) were listed for the entire Nullarbor region, including South Australia (Keighery *et al.* 1986) after a major biological survey of the region. Subsequent to this survey the Nullarbor (Eucla Botanical Region) was subdivided into two biogeographic regions in Western Australia, the Nullarbor Bioregion, restricted to the Miocene seabed, and Hampton Bioregion consisting of the coastal sandy soils of the Roe Plain (Environment Australia 2000). Keighery and Longman

(2004) listed 55 species of weed for the Nullarbor Bioregion and 37 species for the Hampton Bioregion. The Western Australian Herbarium Flora base currently records 59 species for the Nullarbor and 53 for the Hampton, giving a combined list of 78 species (Table 1).

In 2009 I was able to traverse the southern Nullarbor as part of a revisit to discuss the results of the 1984 survey and its implementation (O'Rourke, 2010). During the 2009 survey it became apparent that weeds were poorly recorded for both the Nullarbor and Hampton Biogeographic Regions. During this trip 20 additional weeds were recorded for the bio-regions (Table 1), an increase of almost 20% resulting in a total weed list of 98 species. Voucher collections of the new records have been deposited in PERTH.

Several of the new weed records were located in and around Eucla, some of which were very large extensions to the known ranges of these weeds: *Chloris gayana* previously recorded east to Jerramungup; *Gazania linearis* previously recorded east to Norseman; *Oligocarpus calendulaceus*, previously recorded east to Cocklebidy; *Pennisetum clandestinum*, previously east to Albany; *Plantago lanceolata*, previously recorded east to Bremer Bay; *Scabiosa atropurpurea*, previously 50 km east of Balladonia; and *Reichardia tingitana*, previously recorded east to Balladonia.

The Century Plant, *Agave americana*, recorded from Eyre, previously east to Israelite Bay. This is one of two species (the other is *Oxalis bowiei*) which have survived from the gardens at the Old Telegraph Station.

All of the Caryophyllaceae recorded were previously recorded from the South Australian portion of the Nullarbor, suggesting that weeds are spreading onto the Western Nullarbor from this direction also.

Modes of entry and spread of weeds in the past were disturbance and feed materials for the pastoral industry and settlements (stations, towns). Current modes appear to be vehicles and road verge management (slashing) and spreading from settlements (stations, towns).

DISCUSSION

Most weeds present in the area originate from the Mediterranean and Temperate Europe (56%), Southern Africa (14%), America (8%), rarely from tropical Africa (1%), while the remainder are temperate cosmopolitan weeds (9%). Modes of entry were in the past, feed materials (16% of weeds were fodder plants) for the pastoral industry and gardens at settlements or stations (29% of weeds were garden plants). Current modes appear to be vehicles and road verge management (slashing, 21% of weeds have entered the Nullarbor via roads), and 18% have no obvious means

Table 1. Weed Flora of Nullarbor and Hampton Bioregions.

Key				
Column 1	Family group (listed alphabetically)			
Column 2	Plant Taxon (species, sub-species and varieties) (Listed alphabetically in family groups which are also listed alphabetically)			
Column 3	new record for IBRA regions			
Column 4	Nullarbor IBRA			
Column 5	Hampton IBRA			
Family	Plant Taxon	3	4	5
Aizoaceae				
	Mesembryanthemum crystallinum		X	X
Amaryllidaceae				
	Narcissus tazetta	X		X
Agavaceae				
	Agave americana	X		X
Anacardiaceae				
	Schinus molle	X	X	
Apiaceae				
	Bupleureum semicompositum		X	X
Asparagaceae				
	Asparagus asparagoides		X	X
Asphodelaceae				
	Asphodelus fistulosus		X	X
Asteraceae				
	Arctotheca calendula	X		X
	Arctotheca populifolia			X
	Carduus pycnocephalus		X	X
	Carthamus lanatus		X	
	Centurea melitensis		X	X
	Conyza bonariensis	X	X	
	Conyzasumatrensis	X		X
	Dittrichia graveolens	X	X	
	Gazania rigens	X	X	
	Helichrysum luteo-album	X	X	
	Hypochaeris glabra	X		X
	Lactuca serriola	X	X	
	Oligocarpus calendulaceus		X	
	Reichardia tingitana	X	X	X
	Sonchus oleraceus		X	X
	Xanthium spinosum		X	

Table 1 (cont.)

Family	Plant Taxon	3	4	5
Boraginaceae				
	<i>Buglossis arvensis</i>		X	
	<i>Echium planatagineum</i>		X	
	<i>Heliotropium europeum</i>		X	
Brassicaceae				
	<i>Brassica tournefortii</i>		X	X
	<i>Cakile edentula</i>			X
	<i>Cakile maritima</i>			X
	<i>Carrichtera annua</i>		X	X
	<i>Diplotaxis muralis</i>			X
	<i>Hornungia procumbens</i>			X
	<i>Lepidium africanum</i>		X	X
	<i>Raphanus raphanistrum</i>			X
	<i>Rapistrum rugosum</i>		X	
	<i>Sisymbrium irio</i>			X
	<i>Sisymbrium erysimoides</i>			X
	<i>Sisymbrium orientale</i>			X
Caryophyllaceae				
	<i>Cerastium glomeratum</i>	X		X
	<i>Petrohagia velutina</i>	X		X
	<i>Silene nocturna</i>	X		X
	<i>Stellaria media</i>	X		X
Chenopodiaceae				
	<i>Chenopodium murale</i>		X	X
Cucurbitaceae				
	<i>Cucumis myriocarpus</i>			X
	<i>Ecballium elaterium</i>		X	
Cuscutaceae				
	<i>Cuscuta epithymum</i>	X		X
Dipsacaceae				
	<i>Scabiosa atropurpurea</i>	X	X	
Euphorbiaceae				
	<i>Euphorbia paralias</i>			X
Gentianaceae				
	<i>Centaurium erythraea</i>			X
Geraniaceae				
	<i>Erodium aureum</i>		X	
	<i>Erodium botrys</i>		X	
	<i>Erodium cicutarium</i>		X	X

Table 1 (cont.)

Family	Plant Taxon	3	4	5
Juncaceae				
	<i>Juncus bufonius</i>		X	
Lamiaceae				
	<i>Marubium vulgare</i>		X	X
	<i>Mentha suaveolens</i>		X	
	<i>Salvia verbenacea</i>		X	
Onagraceae				
	<i>Glaucium corniculatum</i>		X	
Orobanchaceae				
	<i>Orobanche minor</i>	X		X
Oxalidaceae				
	<i>Oxalis bowiei</i>			X
Papilionaceae				
	<i>Medicago minima</i>		X	
	<i>Medicago polymorpha</i>		X	
	<i>Medicago truncatula</i>		X	
	<i>Melilotus indica</i>	X		X
	<i>Vicia sativa</i>		X	
Plantaginaceae				
	<i>Plantago lanceolata</i>	X	X	
Poaceae				
	<i>Avena barbata</i>		X	X
	<i>Bromus catharticus</i>		X	
	<i>Bromus rubens</i>		X	X
	<i>Cynodon dactylon</i>	X	X	
	<i>Chloris gayana</i>	X	X	
	<i>Digitaria ciliaris</i>	X	X	
	<i>Ehrharta brevifolia</i>			X
	<i>Ehrharta calycina</i>			X
	<i>Ehrharta longiflora</i>			X
	<i>Eragrostis curvula</i>	X	X	
	<i>Hordeum glaucum</i>		X	X
	<i>Hordeum vulgare</i>	X		X
	<i>Lagurus ovatus</i>			X
	<i>Melinis repens</i>	X	X	
	<i>Parapholis incurva</i>			X
	<i>Pennisetum clandestinum</i>	X	X	
	<i>Phalaris minor</i>			X
	<i>Poa annua</i>			X
	<i>Phalaris minor</i>			X

Table 1 (cont.)

Family	Plant Taxon	3	4	5
	<i>Polypogon monspeliensis</i>		X	
	<i>Rostraria cristata</i>			X
	<i>Rostraria pumila</i>		X	X
	<i>Schismus barbatus</i>		X	X
Polygonaceae				
	<i>Acetosa vescaria</i>		X	
	<i>Acetosella vulgaris</i>	X	X	
	<i>Emex australis</i>		X	
	<i>Polypogon aviculare</i>			X
Primulaceae				
	<i>Anagallis arvensis</i>		X	X
Solanaceae				
	<i>Lycium ferocissimum</i>		X	X
	<i>Nicotiana glaucum</i>		X	X
	<i>Solanum hystrix</i>			X
	<i>Solanum nigrum</i>		X	X
Zygophyllaceae				
	<i>Tribulus terrestris</i>		X	

of introduction, but were probably contaminants of fodder, vehicles or gardens. Spread has been aided by grazing (rabbits and stock), fire and road verge maintenance.

Nullarbor weeds are largely Annuals (60%) or Perennial Herbs (14%). There are few Perennial Grasses (4%), and a handful of Trees (1%), Shrubs (2%), Vines (1%) and Bulbs (1%). This is probably due to the past history of introductions and the arid nature of the climate once gardens are left untended. For example, it appears that Bridal Creeper (*Asparagus asparagoides*) potentially a major bulbous weed of the Roe Plains was only

introduced (or established) around Toolinna Cove and the old Derylinna Station and not grown at Eucla, Eyre or other Stations east of Balladonia.

On the Nullarbor Plains proper with the shallow calcium rich soils, low and erratic rainfall there are few major weeds. The most widespread and serious weed is Wards Weed (*Carrichterra annua*) whose invasion is aided by rabbit grazing and disturbance, loss of palatable shrubs by grazing and fire. There is little chance of a feasible control program of this weed except to contain the spread of this species westward into the goldfields woodlands.

Around the entrances to the

Nullarbor Caves, whose underground rivers are a major geomorphic and biodiversity feature, the cooler cave entrances are invaded by annual weeds, suited to higher nutrients, such as *Solanum nigrum* and *Sisymbrium orientale*. Klaus Tiedeman (DEC District Manager, Esperance, pers.com.) noted that cavers were importing Horehound (*Marubium vulgare*) into cave entrances with equipment. This is a serious weed in calcareous sites in Victoria and will probably be a similar problem in this environment.

The Bunda Cliffs and Roe Plain have a series of widespread annual weeds, probably introduced as fodder contaminants from old grazing leases. These include *Brassica tournefortii*, *Ehrharta longiflora*, and *Reichardia tingitana*, perhaps also *Dittrichia graveolens*. While these weeds are common and probably adversely affecting the native annual flora of these areas through competition, there is realistically little chance of a feasible control program. On the Roe Plains in and adjacent to Eucla National Park, the aggressive shrub weed Box Thorn (*Lycium ferocissimum*) is becoming more common and has the potential to dominate the dune vegetation of this park and should be targeted for control aiming at eradication, if funding was available.

Grice and Martin (2006) list the following terrestrial species as posing the greatest threat to the rangelands of the Southern Australian Zone, which includes

the Nullarbor and Roe Plains; *Acacia nilotica*; *Agave* spp; *Agrostis capillaris*; *Asphodelus fistulosus*; *Bryophyllum* spp.; *Calotropis procera*; *Carrichterra annua*; *Cenchrus ciliaris*; *Cirsium vulgare*; *Citrullus lanatus*; *Coronopus didymus*; *Cryptostegia grandiflora*; *Cuscuta planiflora*; *Eragrostis curvula*, *Holcus lanatus*; *Hyparrhenia hirta*; *Ibicella lutea*; *Lantana camara*; *Lycium ferocissimum*; *Nasella neesiana*; *Opuntia* spp.; *Pennisetum setaceum*; *Proboscidea lousianica*; *Prosopis* spp.; *Schinus molle*; *Sida cordifolia*; *Sida rhombifolia*; *Sporobolus africanus* and *Tamarix aphylla*. Those in bold are currently not present in the region, although several (*Opuntia* and *Tamarix*) are recorded close by. Since this survey suggests that the Eyre Highway and disturbed habitats around towns are the major and continuing source of weeds entering the Nullarbor, the above species should be recorded and controlled under a long term monitoring program undertaken to uncover potentially serious weeds before they spread.

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REFERENCES

ENVIRONMENT AUSTRALIA 2000. *Revision of Interim Biogeographic Regionalisation of Australia*

(IBRA) and Development of version 5.1. Environment Australia, Canberra.
FLORABASE <http://www.florabase.dec.wa.gov.au/> accessed 28-Feb.-2010.

GRICE, A. and MARTIN, T.G. 2006. *The management of weeds and their impact on biodiversity in rangelands*. CRC Australian Weed Management, Townsville.

KEIGHERY, G.J. and LONGMAN, V. 2004. The naturalized vascular plants of Western Australia 1: Checklist, Environmental Weeds and Distribution in IBRA regions. *Plant Protection Quarterly* **19**: 12–32.

KEIGHERY, G.J., ROBINSON, A.C. and DOWNING B.H. 1987. *Vegetation* pp. 39-102, In: *A biological survey*

of the Nullarbor Region of South and Western Australia in 1984, eds. MCKENZIE, N.L. and ROBINSON, A.C.. S.A. Department of Environment and Planning, W.A. Department of Conservation and Land Management and Australian National Parks and Wildlife Service.

MCKENZIE, N.L. and ROBINSON, A.C. (Eds) 1987. *A biological survey of the Nullarbor Region of South and Western Australia in 1984*. S.A. Department of Environment and Planning, W.A. Department of Conservation and Land Management and Australian National Parks and Wildlife Service.

O'ROURKES, L. 2010. Nature of the Nullarbor. *Landscape* **25**: 32–41.